

Article

Mathematical Support for Financing Social Innovations

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Received: 27 October 2020; Accepted: 28 November 2020; Published: 1 December 2020



Abstract: The use of socially innovative projects for solving social problems by actively involving civil society is a promising and much sought-after area of social development. However, the priority of social goals over economic outcomes in the implementation of such projects significantly limits the speed and effectiveness of their implementation. In this connection, the use of a mathematical tool for the financing and resource provision of social innovations creates new opportunities in terms of the assessment and development of such projects. In order to develop and substantiate tools for the mathematical support of financing social innovations, the role of the collaborative economy in the development of social innovations initiated from below is substantiated. The proposed mathematical toolkit includes a linear algorithm describing the logic of the developed approach, a methodology for assessing socially-innovative projects based on an adapted McKinsey matrix, a methodology for assessing the institutional environment, as well as a mapping of project correspondences in an adapted McKinsey matrix along with collaborative economic tools recommended for resource provision. The described set of collaborative economy tools is recommended for use in the development and implementation of social innovations. The mathematically-described algorithm proposed by the authors is aimed at developing resource provision strategies for social projects by evaluating their competitiveness and attractiveness in terms of the social function they perform while taking the characteristics of the particular institutional environment into consideration. The result of applying this algorithm comprises a set of collaborative economy tools for use in the development and implementation of socially-innovative projects. The application of this algorithm is shown on the example of an evaluation of ten projects implemented in the Ural region and applying for assistance from support funds. The theoretical significance of the proposed results lies in the development of methodological tools for assessing socially-innovative projects. The practical significance lies in the possibility of applying the obtained results in the development of an online calculator used to assist in forming a social project resource provision strategy.

Keywords: social innovation; financing; instruments; collaborative economy; algorithm; assessment

1. Introduction

The development and implementation of socially innovative projects is becoming one of the most important areas in the evolution of socio-economic systems. While, on the one hand, the aggravation of social problems—including in connection with the spread of coronavirus infection—has contributed to the identification of institutional voids and dysfunctions in the public administration system, on the

other hand, it has accelerated the development and application of new mechanisms and tools for the development of social innovations initiated from below. The focus on such grassroots innovations is caused by the specific characteristics of the consolidation of formal and informal norms and rules of interaction, as well as the specific features of the development of norms as part of a system of collective actions [1,2]. The possibilities of using new models of the behaviour of economic agents [3], including those formed due to the digitalisation of socio-economic processes, led to the formation of new, more effective ways of creating and distributing social solutions.

Observing the characteristics of the present stage of social innovation development, we can already talk about an increase in civic activity and the formation of a solidarity economy, as well as the expansion of a cooperation economy with a focus on solving social and environmental problems faced by contemporary society [4]. The Russian researcher L. Polishchuk notes that the capacity of citizens for collective action comprises a form of social capital [5]. At the same time, a special role for collective action is noted in countries whose economies are in transition and where the production of public goods is not at a sufficiently high level [6]. Under such conditions, civic engagement in the development of social innovations begins to acquire special significance, as well as offering a high potential for solving socially-significant problems.

When considering this topic, also the transformation of existing business models, in general, should be noticed. Interest in the research of social entrepreneurship and corporate social responsibility [7] confirms the importance of achieving not only commercial but also social goals in business. Li et al. explore stock market reactions to corporate social performance. They show that CSR reputation contributes positively to a firm's short-term superior equity performance; CSR lists facilitate market correction of mispricing intangibles. As a result, CSR promotes socially responsible investing (SRI) and provides guidance for investors who would like to do well financially by doing good socially [8].

At the same time, digitalisation of technological, socio-economic, organisational processes contributes to the formation of new tools for developing social innovations. In addition to the blurring of geographical boundaries, a general increase in the speed of transactions has led to the development and dissemination of new mechanisms for providing financial support to socially innovative projects.

The development of social innovations initiated by civil society requires the development and operation of special methodological support facilities, as well as mechanisms for attracting resources for the implementation of social projects. This need has led to a more detailed study of tools and methodologies for assessing social innovation, as well as to the formulation of recommendations concerning possible means of attracting resources through the use of digital platforms to facilitate opportunities for collective action.

Social innovations play a special role in the institutional development of a territory, resulting in changes to the usual models of behaviour on the part of economic agents. Institutional change serves as a driver for policy support; as most often it is the collective engagement of civil society actors and groups that formed socially innovative projects which in later stages drives and stimulates some policy support. Analysing forestry, Ludvig et al. show that the innovation process can trigger new institutional arrangements and policies (bottom-up) [9]. Considering environmental knowledge spillovers, Aldieri et al. [10] show their impact on the quality of institutions, at the same time confirming the role of diversification in innovation analysis. The role of diversification in innovative development and the need to take territorial characteristics into account are also discussed in the work by Wang et al. [11].

Within the framework of the present study, we have recourse to a mathematical apparatus whose function is to describe the process of forming a set of recommendations in order to attract resources for the implementation of a socially innovative project. By mathematical support for financing social innovation, we refer to the process of applying a numerical description to describe the key stages, whose sequential implementation allows a social innovator to draw up a list of recommendations for attracting resources. The continuing relevance of the use of the mathematical apparatus lies in the formalisation of the proposed tools and the possible future automation of research results.

Thus, the purpose of this study is to develop and substantiate a mathematical support toolkit for financing social innovation. To achieve the goal of this study, a review of the current tools for supporting social innovation was carried out. In order to formulate recommendations regarding the use of a particular set of development support tools, which are the result of the digitalisation of a number of different processes and the advancement of a collaborative economy, a logical algorithm was developed and mathematically described.

Section 2 reveals the essence of the concept of social innovation, demonstrating the role of digitalisation and presenting an overview of approaches that can be used in assessing and formulating directions for the development of social and innovative projects, as well as illustrating the potential of using the mathematical tool to support the development of social innovation.

Section 3 presents a detailed description of the approach proposed by the authors for the formation of a strategy for attracting resources to a project, including its direct evaluation according to a set of criteria and a determination of its position in the adapted McKinsey matrix, forming a list of platform economy tools based on the position in the matrix, as well as making necessary adjustments that take into account the characteristics of the institutional environment.

Section 4 shows the results of applying the proposed approach on the example of an analysis of social projects in the Ural region (Russia). Section 5 substantiates the possibilities as well as outlining some limitations of its use. In the conclusion, a critical assessment of the obtained results is presented along with directions for further development.

2. Toolkit for Financing Social Innovations in the Context of the Development of a Collaborative Economy

2.1. Digitalisation as a Development Source for Social Innovation Support Tools

Despite a substantial body of accumulated research covering the development of social innovation over the past 20 years, the “conceptual ambiguity” [12] still attached to this term is confirmed by the many new approaches to its study [13,14]. On the one hand, it is possible to refer to this concept in interdisciplinary terms, since it is not only socially significant, but also includes political, economic and institutional aspects; on the other hand, in terms of the scale of social changes, which are both local and global, implemented within a specific period of time, aimed at solving a specific problem or make significant, long-term changes in the socio-economic structure.

Within the framework of the present study, we focus on socially innovative projects aimed at eliminating or ameliorating public sector failures. Here, social innovations are defined as new ideas and projects aimed at solving socially significant problems [15]. If successfully implemented, the introduction of socially-innovative projects can not only lead to the mitigation of a public sector failure, but also to the formation of new norms that transform the existing system of institutions.

Along with the introduction of new mechanisms for supporting and implementing social innovations, the transformation of social and innovative activities was facilitated by digitalisation introduced at various levels of management of ongoing technological, socio-economic, and organisational processes. Alshawaaf and Hee Lee [16] note that digitalisation processes promote creative activity, which affects the implementation of the social mission of the organisation. It is important to note that this study deals specifically with organisations having a social character. In addition, virtual interaction in the online environment reduces transaction costs, contributing to a wider dissemination of social value.

Sanchez, Lanza, Munoz show how the Internet of Things (IoT) can contribute to the development of social innovation on the example of the city of Santander [17]. Along with the need to develop infrastructure and maintain openness of the system, joint creativity—a digitalisation strategy in which various stakeholders cooperate and jointly produce a mutually beneficial product/service—has become one of the key urban development principles.

The rapid development of digital and technological opportunities has stimulated the creation of new models of behaviour and the formation of new rules and norms for the interaction of economic agents. However, the consolidation of rules and norms often involves a certain time lag, resulting in

a more gradual spread of a particular rule or norm and associated with the process of mental transformation of the participants in the interaction, which is due to the fact that an institution is understood, first of all, in terms of a set of established rules and regulations [18].

Another important factor influencing socially-innovative activity is the development of civic initiatives. According to the European Commission report *Social Innovation as a Trigger for Transformations*, “Social innovation and collaborative networks should be used to the fullest in order to enhance public and civil society participation...” [4]. For example, on the example of the Ulrum 2034 project aimed at developing communities in the context of rural depopulation, Ubels, Haartsen and Bock revealed that, although the majority of residents had a positive attitude towards this community-oriented initiative, new forms of cooperation are only seen as valuable when accompanied by tangible results. At the same time, participants with a lower socio-economic status are less proactive, etc. [19].

Along with an analysis of the effectiveness of social and innovative projects implemented from below, the potential of such projects was demonstrated by an increase in civic engagement in social problem solving [15]. As a new business model, the cooperation economy [20] also reveals sources of growth for further development along with tools for implementation. The collaborative- or shared economy also provides a set of tools for the development of social projects as discussed in more detail in the next paragraph.

2.2. Support Tools for Socially-Innovative Projects in the Context of Digitalisation of Social and Economic Processes

The development of a shared economy and an increase in civic engagement have led to the emergence of new tools for resourcing social innovations based on the assumption of civil society activism.

Instruments of the shared economy can be classified into 3 groups depending on the type of resources that will be used: material, labour, financial. In this way, the tools were identified for ensuring the financial support of the project (fundraising, crowdfunding, crowdlending, crowdinvesting, match funding), ensuring the implementation of work on the project (crowdsourcing, crowdworking, crowdmarketing, crowdtesting, crowdacting), providing the project with the required material resources (collaborative resource utilisation generally). Let's consider each of the groups in more detail.

As a new method and potentially disruptive innovation for financing a multitude of new entrepreneurial ventures without standard financial intermediaries, crowdfunding has gained widespread acceptance over the past 20 years [21]. Although the idea of co-financing projects as a means of raising funds for enterprises of social value and significance has been around for several hundred years, the current stage of its development is associated with the introduction of digital technologies. The need to analyse the development dynamics of this type of financial innovation [22] has led to an interest in studying the motives that lead to a project receiving financial support, as well as identifying the correspondence or contradiction of crowdfunding services with existing theories about the dynamics of successful entrepreneurial financing [23,24]. The authors noted that one of the most difficult parts of the study of entrepreneurship is related to sociocultural aspects, which have the elusive nature of willingness, creativity, perseverance, as well as the capability of transforming traditional values in the process of entrepreneurial development. Taking a holistic view, Mollick suggests that the most important factors in determining the success of crowdfunding are personal connections, the underlying quality of a project, as well as its geography [25]. In addition, Busse and Gregus describe options of crowdfunding types are reward-based platforms, donation-based platforms, equity-based platforms or lending-based platforms [26]. Thus, crowdfunding is a complex phenomenon that defines a combination of behavioural, psychological, economic, social and institutional factors. At the same time, the potential expansion of this tool is also a consequence of the transformation of incentives of economic agents in the context of changing socio-economic and institutional conditions caused by technological development, etc. All of the above confirms the potential of using this approach in the development of social innovations.

Crowdfunding, in turn, comprises a special case of fundraising [27], which generally refers to the process of attracting necessary financial resources for realising a project or conducting a particular activity. The concept of fundraising arose from the activities of non-profit organisations in the United States involving the professional search for budget subsidies and funds from the state and municipal authorities, governing bodies and institutions, sponsors and philanthropists, entrepreneurs, charitable foundations and commercial organisations that allocate subsidies for projects.

A new innovative form of external financing for entrepreneurial firms is the so-called equity crowdfunding or crowdfinancing, by means of which capital can be raised from many small investing companies through Internet platforms [28,29]. When considering whether to support a crowdfinancing campaign, small investors assess the potential of both financial and non-financial returns. This form of funding was presented for the first time on the French platform WiSeed [30]. Currently, this topic is the subject of increasing interest both among the research community and in the implementation of various types of projects.

One of the main forms is crowdlending, essentially consisting of lending by individuals to other individuals or legal entities via special Internet platforms [31]. With crowdlending, the lender only invests via specific loan requests (for example, through platforms such as Lending Club or Funding Circle). Within the framework of this form of financing, it is possible to distinguish between different lifecycle stages of the company in which the investment is made. While some platforms focus on financing loans from startups or new business ideas (e.g., Seedmatch [32]), others focus on financing projects from existing companies.

The concept of match-funding implies the joint participation of civil society in a project, for which a confirmation of the relevance of the project and its social significance, working together with state programs and funds, is a prerequisite. This tool can be used in the development of special programs for supporting social projects.

Crowdworking, which is seen as a new form of employment [33] based around digital technologies, is also part of the so-called “gig economy”. This form includes all types of paid work organised through online labour platforms [34,35]. These platforms function as intermediaries between workers and job providers, facilitating the description, presentation, acceptance and payment of work performed [36]. Examples of such platforms include AMT, Upwork, TopCoder, CrowdFlower, and Clickworker [37]. Bernard Marr notes that crowdworking opens up new career opportunities for workers in online markets [38].

However, the temporary nature, remoteness, scale of this phenomenon can cause difficulties in terms of effective management, undermining confidence in its strategic value. In this connection, various mechanisms and models presenting options for regulating this type of activity, are currently under development. For example, Elham Shafiei Gol, Mari-Klara Stein, Michel Avital proposed a conceptual model that combines a control system with a coordination system as two complementary mechanisms that ensure the effectiveness of crowdworking platform management—and, as a result, benefits for job providers [39]. Effective platform management becomes more important when the creative collaboration takes a nonstandard form. Gol et al. argue that crowdworking can not only help ensure fair wages and flexible working hours, but also increase the value and competitiveness of organisations [39].

Crowdsourcing describes “the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call” [40]. One of the advantages of this tool is the use of additional knowledge and skills to achieve their goals [41]. However, ontological ambiguity may ensue due to the boundaries of crowdsourcing not being clearly defined. In order to solve this problem, researchers attempt to systematise the various forms of crowdsourcing [42,43].

One form of crowdsourcing is crowdtesting, a new trend in software testing used to accelerate testing processes by involving online workers to perform various types of test tasks [44]. With crowdtesting,

testing tasks are assigned to team members whose diverse testing environments/platforms, experience and skills lead to more reliable, cost-effective and efficient testing results.

Crowdmarketing is a management process based on the functioning of network communities, aimed at using the effect of the interaction of community members to achieve the company's marketing goals, taking into account the principle of optimal management [45]. The uniqueness of crowdmarketing lies in a consideration of the nonlinear and dynamic nature of network processes.

Crowdacting is defined as “coordinated, conditional, collective action to achieve a positive social and/or environmental goal” [46]. Within the framework of this tool, we are talking about the investment of various kinds of effort. The term was first used in 2015 by CollAction, a non-profit organisation that created the world's first official crowdacting platform (www.collaction.org). Crowdacting develops under the condition that three conditions are met: (1) clarity of purpose; (2) orientation towards social and environmental goals; (3) joint action. The use of crowdacting at the stage of project development also demonstrates the importance of the project for the potential audience involved in this type of activity. In this case, the enforcement mechanism varies. The motivation for action consists in the relevance of solving the given problem, as well as collective participation, which becomes not only a source of resources, but also moral support for the possibility of realising a particular goal.

In its narrow interpretation, the shared economy focuses on collaborative consumption. Shared economy projects like carsharing and Airbnb are examples of resource sharing via digital platforms. In this regard, shared consumption can be viewed as a separate instrument of the shared economy. In this case, it is not so much about the collective consumption of a finished product, but rather the collective consumption of resources (in particular, material resources). In the present study, this concept is described by the term “collaborative consumption”.

Figure 1 presents a schematic view of the relationship between the above terms.

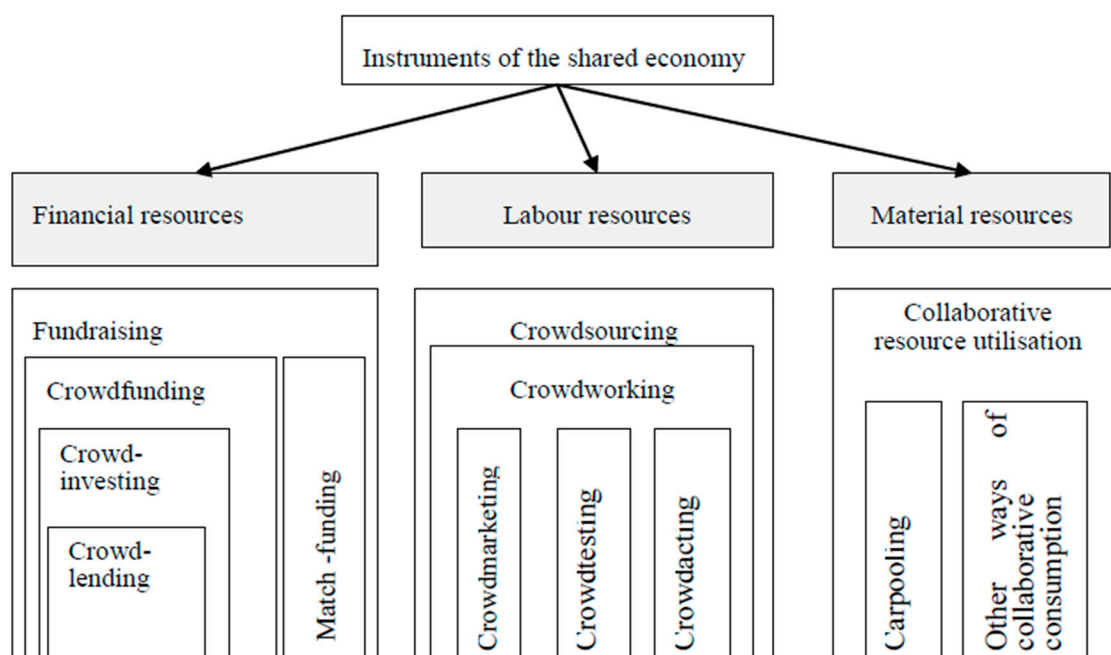


Figure 1. The structure of instruments of the shared economy.

The shared economy tools discussed in this article reveal the new role of civil society in socio-economic processes, whose application provides a means by which institutional voids and dysfunctions in existing socio-economic systems can be ameliorated.

The expansion of such approaches has already resulted in significant institutional transformations manifested in a set of technological and behavioural changes. While on the one hand, the digitalisation of economic processes helps to eliminate barriers to interaction, reduce transaction costs and increase

the level of trust, on the other hand, the transfer of civil-society focus from exclusively economic problems to social and environmental problems has created the conditions for using shared economy tools to undertake socially-significant projects. In this case, the description of the process of determining the recommended tools can be implemented using the mathematical apparatus, which is discussed in more detail in the next paragraph.

2.3. Mathematical Support for Financing Social and Innovative Activities

When analysing the mathematical apparatus used for the development of this type of activity, the methods of the assessment stage and the management or decision-making stage regarding the resource provision of the project should be considered separately.

When considering the methods for analysing social innovation, it is necessary first of all to refer to universal methods of project evaluation—in particular, in terms of income, cost, and comparison methods [47]. Within the framework of the cost method, a direct analysis of the assets and costs of the project is carried out, data on which can be obtained from the corresponding financial documents in the event of a project implementation or have a predictive character at the stage of project development. The limitations of the cost method consist in the difficulty in determining the cost of labour for project participants, since driven by social rather than economic motives. The limitations of income-based approaches consist in the complexity of assessing the social results of the project, which require a comparison object. When detailing this group, mention should be made of the generally accepted methods of calculating efficiency—in particular the discounted income method, the capitalisation method, as well as the calculation of profitability, financial stability, etc. A limitation of the comparative project appraisal method is that it requires prior implementation experience. However, both the performance and salient characteristics of social projects are highly variable.

In addition, unlike other types of projects, a short-term period for the implementation of a socially-innovative project can be a positive result for the territory under consideration, since indicating the solution of a social problem for the period corresponding to the duration of its implementation.

The presented methods are based on a description of the economic component of the project. However, in terms of assessing the social impact of a project, their potential application is tenuous. Challenges in assessing social innovation relate to at least three factors: the uniqueness of each SI and its context, the hype and “buzzwordiness” in SI discourse. Evaluations conducted on SIs have employed a variety of designs, including those often used for summative evaluation such as RCTs, quasi-experimental designs, and social impact assessment (e.g., social return on investment; Corporation for National and Community Service) [48].

The problematic of the process for assessing social innovation consists in a lack of a clear definition of what specific aspect is to be assessed. Thus, on the basis of research carried out on this topic, Svensson et al. show the possibility of evaluating the results (outcomes), means of implementation and development prospects (vision). Moreover, the analysis itself is largely of a qualitative nature, thus forming a basis for further research on this topic [48].

The mathematical tools for the process of resource provision of social and innovative projects have been defined to a greater extent. Mathematical multi-criteria decision-making methods (MCDM) have a high potential for the analysis of socially innovative projects. At this stage, game theory tools and fuzzy logic methods can also be applied.

The use of MCDM is quite common when researching the development of innovative projects in general. In particular, Fernandes de Oliveira et al. apply this method when evaluating projects in the context of the “smart city” [49]. They consider the criteria of originality, innovation, degree of elaboration and quality of presentation. At the subsequent stages of the study, the authors use the DEMATEL method, which allows the relationship between these criteria to be determined and a map to be drawn up showing this relationship. In addition, M.C. Lo uses this method to prioritise high-tech product development improvement by analysing and linking criteria such as technology integration,

production capability, marketing, customer needs, market potentiality, strategy deployment and timing [50].

The task set by the authors of this study was to develop an integrated approach that would support not only assessment, but also decision-making regarding the choice of a shared economy instrument. This then became the justification for the development of the original approach to solving the indicated problem.

3. Methodology

3.1. Methodological Design

The procedure for this study included the following steps. At the first stage, when considering a specific socially innovative project, the social function to be performed by the project requiring support was defined. As part of the study, reproduction, stimulating, investment and marketing functions were identified, determining the priority of implementation by means of an expert assessment. The basis for determining the recommended instruments of a collaborative economy was formed by a definition of functions.

At the second stage, when assessing social and innovative projects, a system of criteria was used to characterise the competitiveness and attractiveness of a particular project. The determination of a social project's implementation potential became the basis for defining a set of additional tools for use in designing a corresponding development strategy.

At the third stage, in order to analyse the impact of the institutional environment and identify relevant barriers, relevant features were assessed according to a number of criteria. On the basis of the presented logic, an algorithm for developing a resource provision strategy for a social project was developed.

The utility of this algorithm was demonstrated in the analysis of 10 social projects of the Ural region that applied to support organisations for funding. For the information base of the study, we referred to scientific publications indexed in the WoS and Scopus international scientific citation databases, reports and data published by the Sverdlovsk Regional Fund for Entrepreneurship Support and the Internet portal of the Presidential Grants Fund. In addition, when establishing the coding of certain criteria, we relied on the results of previous studies and the distinctive characteristics of the social and innovative development of the Ural region.

Research methods comprised systematisation and categorisation, algorithmisation, information coding and comparative analysis, the expert assessment method, as well as the matrix method, which made it possible to describe this algorithm using mathematical tools.

At each of the stages, we used the method developed for assessing or establishing a link between the factor and the result (stage 1, stage 3). The novelty of this study lies both in the development of an original set of tools—in particular, by using an adapted McKinsey matrix—as well as in the presentation of the linear algorithm that forms the basis of the proposed approach.

As a result, a strategy for resource provision of a social and innovative project in four stages was formulated. Let us consider each of these stages in more detail.

3.2. Author's Approach

This paragraph details our proposed approach.

3.2.1. Step 1. Determination of Tools Based on the Assessment of the Functions of Social Innovation

First of all, a set of variables was introduced for use in the mathematical description of the project under development. If the project is designated as SI, then FSI represents the set of functions that are to be implemented within the project. Within the framework of this study, reproduction, stimulation, investment and marketing functions of social innovations are considered.

The reproductive function is understood as the capability of social innovations to fill public sector lacunae in terms of addressing a lack of public goods. The stimulation function is understood as the ability of social innovation to form motives and incentives for all categories of citizens to take an initiative in solving social problems, while the investment function consists in the capacity to direct received income to the creation and implementation of a social innovation. The marketing function is considered as a means of promoting and analysing a manufactured product, good or service through the implementation of a particular socially-innovative project. In addition to the above-listed functions, a regulatory function can also be considered that characterises the ability of social innovation to change the foundations and traditions of society to form new economic institutions.

When comparing a function and instrument of the shared economy, a set of criteria was determined, allowing the identification of belonging to the corresponding function performed by the social project. Table 1 shows the designated set of criteria, their coding, and the relevant tool corresponding to this code.

Thus, the first stage can be characterised by the Equation (1):

$$FSI = \begin{pmatrix} R_i \\ S_j \\ I_k \\ M_l \end{pmatrix} \quad (1)$$

where i, j, k , and l are the parameters characterising the criterion of the social innovation function, n is the code for this criterion; R, S, I , and M are the variables corresponding to the reproduction (R), incentive (S), investment (I), and marketing (M) functions (Table 1).

The equity economy instrument recommended for use is determined on the basis of the code assigned for a particular function. The list of tools formed at this stage will be described by the following LT (List of Tools) Equation (2):

$$LT = t(R_i) \cup t(S_j) \cup t(I_k) \cup t(M_l) = \{t_1, t_2 \dots t_n\}, \quad (2)$$

where t (tool) is the tool defined by the corresponding function ($t(R_i), t(S_j), t(I_k), t(M_l)$);

LT—the tool dataset. It is important to note the significance of the position of the instruments $t_1, t_2 \dots t_n$ in the presented row. These are arranged in descending order of priority (t_1 is the highest priority instrument; t_n is the lowest priority instrument).

It is important to note that the reproductive function is understood here as the capability of social innovations to fill public sector lacunae in terms of addressing a lack of public goods. The stimulation function should be understood in terms of the ability of social innovation to form motives and incentives for all categories of citizens to take the initiative in solving social problems. The investment function assumes the presence of the investment potential of the project and its ability to attract different types of investors [51]. The marketing function is considered as a means of promoting and analysing a manufactured product, good or service through the implementation of a particular socially-innovative project.

Table 1. Dependence of functions and instruments of the shared economy.

Criterion	Function Coding	Instruments of the Shared Economy
Reproduction function		
Creation of a socially-significant product/ service (number of consumers) (R1)	1 point—from 0 to 100 people (P11)	Crowdfunding
	2 points—from 101 to 200 people	Crowdworking
	3 points—more than 201 people	Match Funding
Belonging to the level of solving social problems in society (R ₂)	1 point—not connected to anything	Crowdacting
	2 points—decision of the municipality	Match Funding
	3 points—decision at the regional level	
Stimulation function		
Realisation of the creative potential of the project developer (S ₁)	1 point—new for the organisation (S11)	Crowdsourcing
	2 points—new for the city, region or industry (S12)	Match Funding
	3 points—new at the national or global level (S13)	Crowdacting
Involvement of civil society in solving social problems (number of volunteers) (S ₂)	1 point—from 0 to 25 people (S21)	Crowdworking
	2 points—from 26 to 50 people (S22)	Crowdworking
	3 points—more than 51 people (S23)	Crowdacting
Investment function		
Attracting investments for solving socially-significant problems (I ₁)	0 points—own funds	Crowdinvesting
	1 point—subsidies	Support funds
	2 points—own funds, foundation funding	Match Funding
	3 points—subsidies and foundation funding	Crowdinvesting
Marketing function		
Using a social and innovative project to promote a company (M ₁)	1 point—no change or a decrease in consumers up to 5%	Crowdacting
	2 points—5% increase in consumers	Crowdmarketing
	3 points—10% increase in consumers	Crowdinvesting
Popularisation and formation of new values in society (M ₂)	1 point—advertising through the recommendations of friends	Crowdtesting
	2 points—advertising through Internet resources	Crowdmarketing
	3 points—advertising through the mass media	Crowdmarketing

When coding the presented functions, we relied on the results of previous studies reporting on the experience of implementing Russian social innovations. We have carried out a number of studies characterising: (1) the features of the development of social innovations and their impact on the socio-economic system; (2) social and commercial benefits from the project, measured by the number of consumers and profit from the project, respectively; (3) the influence of the formal and informal institutional environment on the development of social innovation. As part of the research, social innovators were interviewed about various aspects of a social enterprise at various stages of its functioning along with analysed data from financial statements of social enterprises. Based on the obtained results, it was concluded that the development of small, medium and large social projects is heterogeneous, differing both in the size of the budget and, as a result, in the scale of distribution. The results of the presented studies became the basis for the development of criteria codes P_1 , S_2 , M_1 .

When coding criteria R_2 , S_1 , I_1 , and M_2 , we also relied on the results of previous studies—in particular, on the results of a survey of social innovators about sources of funding, mechanisms for disseminating information about the project, its scale, as well as a review of scientific sources evaluating innovative projects in general. When establishing the correspondence between the instruments of the shared economy and the codes presented in Table 2, we relied on resource requirement data for each of the types of projects; this also followed from previous studies. When applied to other territories, the coding will depend on socio-economic and institutional characteristics and will consequently require additional research to establish development patterns of social and innovative activities. However, the coding can be borrowed or adapted for the purposes of assessment by territories operating under similar conditions [52–54].

When coding the project characteristics according to the P_1 criterion, the size of the social project was taken into account. The findings of previous studies into the influence of institutional factors on the development of social innovation showing that large, medium and small projects have different development characteristics, imply the need to take into account the size of the project [52] when developing a strategy for its resource provision. In this case, we took into account the number of consumers of the created socially-significant product or service. The size of the project determines the volume of various types of resources needed. The expediency of using crowdfunding follows from the importance of obtaining financial resources at the first stage of development when developing small projects. For larger projects, processes of attracting labour resources become more relevant, also helping to ensure the popularisation of the project. For large projects, it is also expedient to consider joint financing in the form of match funding, which implies both the involvement of civil society and state or municipal support.

When coding a project according to the P_2 criterion, the level of its implementation was taken into account. Thus, in the absence of communication with the state or municipal level, it is advisable to resort to crowdfunding, by which means both financial and labour resources can be attracted. When considering projects related to the state and municipal levels of government, it is necessary to take into account the possibility of using match funding, presupposing the involvement of civil society and executive authorities.

The S_1 criterion also takes into account the scope of the project's novelty. If the social innovation is new to the organisation, then crowdsourcing can be used as a way to attract different types of resources. When implementing projects on a local and regional scale, match funding becomes significant; here, traditional methods of financing projects in the form of grants, subsidies, etc. can also be used. When implementing projects at a national or global level, crowdfunding and crowdfunding become viable strategies. In terms of the S_2 criterion, the primary tools will be crowdfunding and crowdworking. As part of the implementation of the investment function, crowdinvesting can be used when focusing exclusively on the own funds of stakeholders, while match funding can be used with mixed financing. If the project relies solely on grants or subsidies, traditional forms of support will be used.

Table 2. Criteria for evaluating socially innovative projects.

Criteria Group	Assessment Criteria	Description of Criteria	Measurement	Weighting Coefficient α_i, β_j
Competitive criteria	Novelty (B_1)	Utilisation of new approaches in solving a social problem	1 point—new for organisation 2 points—new for a city, region or industry 3 points—new at the national or global level.	0.4
	Dynamics of financing (revenues) of the project (B_2)	Increase in funding/revenues for the project in the current year. If the project is realised in the first year, then 2 points are allocated	1 point - decrease in the volume of funding/revenues in the period under review by more than 5% 2 points—increase/decrease in income less than 5%; also indicated for projects being implemented for the first time; 3 points—funding/revenue growth of more than 5%	0.3
	The degree of influence of innovation on society (B_3)	Impact of a social project on society through the involvement of volunteers	Number of volunteers: 1 point—from 0 to 25 people 2 points—from 25 to 50 people 3 points—more than 50 people	0.3
Attractiveness criteria	Project area (A_1)	Project distribution area	1 point—at the level of city or region 2 points—at the national level 3 points—at the global level	0.3
	Sources of funding (A_2)	Support of the state, enterprise, organisation or own funds	1 point—subsidies 2 points—own funds, foundation funding 3 points—subsidies, own funds and foundation funding	0.4
	Level of demand (A_3)	Number of consumers of the proposed solution to the social problem	1 point—from 0 to 100 people 2 points—from 101 to 200 people 3 points—more than 200 people	0.3

When considering the M1 criterion in the absence or low growth of consumers, crowdmarketing can be used as a way of promoting and disseminating information; for larger projects—crowdfunding as a source of funds to promote the project; for relatively large projects—crowdinvesting as a means of investing money in competitive projects. For the implementation of the M₂ function, it is proposed to use crowdttesting and crowdmarketing.

The above-described tools allow the drawing down of labour and financial resources. If it is necessary to attract material resources, joint consumption can be used in the implementation of each and any project, regardless of what functions it performs. Fundraising is also absent from the presented list of instruments due to it already including the presented instruments of the equity economy.

The dependence presented in the table using mathematical systems can be described as follows:

$$\begin{aligned}
 LT = \begin{bmatrix} t(P) \\ t(S) \\ t(I) \\ t(M) \end{bmatrix} = & \begin{bmatrix} \left\{ \begin{array}{l} \text{Crowdfunding if } N \in [1; 100] \\ \text{Crowdworking, if } N \in [101; 200] \\ \text{Match funding, if } N \in [200; +\infty] \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdacting if the level is undefined} \\ \text{Match funding if municipal level} \\ \text{Match funding if regional level} \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdsourcing new to the organisation} \\ \text{Match funding new to a city, region or industry} \\ \text{Crowdacting, new nationally and/or globally} \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdworking if } V \in [0; 25] \\ \text{Crowdworking if } V \in [26; 50] \\ \text{Crowdacting if } V \in [51; \infty] \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdinvesting if own funds} \\ \text{Support funds, if subsidies} \\ \text{Match funding, if funds} \\ \text{Match funding, if subsidies and funds} \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdmarketing, } \Delta C \in [0; 5], \% \\ \text{Crowdlending, } \Delta C \in [5; 10] \\ \text{Crowdinvesting, } \Delta C \in [10; +\infty] \end{array} \right. \\ \left\{ \begin{array}{l} \text{Crowdttesting, advertising through the recommendations of friends} \\ \text{Crowdmarketing, advertising via Internet resources} \\ \text{Crowdmarketing, media advertising} \end{array} \right. \end{bmatrix} \quad (3)
 \end{aligned}$$

where N is the number of project consumers, V is the number of project volunteers, and ΔC is the increase in consumers during the project.

3.2.2. Step 2. Determination of Resource Provision Tools Based on the Project's Attractiveness and Competitiveness Analysis

At the second stage, the potential of the project is directly determined. When evaluating projects, it is proposed to use the division into the criteria of competitiveness and attractiveness; this is presented in the form of a McKinsey matrix used to determine the development potential of a project or company.

In the process of adapting this tool to social and innovative activities, a set of criteria was drawn up that describe, respectively, the business strength and industry attractiveness of the project. Here, social innovation competitiveness is understood in terms of the ability of a social solution to meet changing market conditions and withstand competition among other projects. The competitiveness

of a socially innovative project is weighted towards its economic advantages. When considering the attractiveness of socially innovative projects, it will be necessary to consider their ability to solve social, environmental, and cultural problems. In other words, the emphasis is mainly on the social utility of the solution.

In order to identify the list of criteria for assessing socially-innovative projects, a review of approaches to assessing social innovation was carried out. Lucian Gramescu proposes to evaluate the effectiveness of social innovation through an assessment of social entrepreneurship based on the BENISI database. The author analyses such criteria as the territory of implementation, the duration of existence of the organisation, income, the degree of civic activity (number of volunteers involved) and type of enterprise [55].

Rasa and Lina Dainienė evaluate social innovation using three triple bottom line (TBL) measurement indicators—economic, environmental and social. Here, the environmental dimension refers to the potential impact of social innovation on their sustainability, the economic dimension rests on a definition of profit following the introduction of social innovation, while the social dimension refers to labour inputs and social impact [56].

Cagri Bulut, Hakan Eren, and Duygu Seckin Halac measure social innovation through a psychometric survey-based analysis. Their methodology is based on an individual measurement of social innovation trends, including sections for identifying potential initiators of social innovations, as well as potential researchers, in order to form a theoretical and methodological basis [57].

Soma et al. argue that social innovation should be evaluated according to a three-dimensional lens comprising resonance (an environment in which there are certain resources for the exchange of ideas and visions), scale (target audience and participants in the social innovation project) and scope (degree of change following the implementation of social innovation in society, including the rules and regulations). We note that from the second perspective, the adaptive cycle is taken as a basis: growth, stability/balance, release and reorganisation [58].

Oeij et al. examined the impact of already implemented social innovations through the innovative journey model developed by Van de Ven et al., where the main criteria were sources of financing, organisational structure, the possibility of creating an organisation, the ratio of employees to volunteers and the motivation of developers of social innovation, thereby determining the level of competitiveness and attractiveness of social innovation [59].

The list of criteria proposed by the authors of this study includes novelty, dynamics of funding, the degree of influence of innovation on society, the territory of the project, sources of funding and the degree of demand. These criteria were divided into two groups characterising the attractiveness $B(SI)$ and competitiveness of the social project $A(SI)$ (2)

$$SI = \begin{pmatrix} B_1 & A_1 \\ B_2 & A_2 \\ B_3 & A_3 \\ B_4 & A_4 \end{pmatrix}, \quad (4)$$

where

B_i is the value of criterion i for assessing the competitiveness of a socially innovative project,

A_j is the value of criterion j for assessing the competitiveness of a socially innovative project,

i, j are the numbers of criteria.

Table 2 provides a detailed explanation of these criteria, as well as the methodology used for scoring. The set of criteria itself was determined through the presented literature review, while the coding was based on the results obtained within the framework of previous studies.

In order to calculate the final value of competitiveness and attractiveness, an expert assessment was applied. The panel of experts comprised 20 people representing the scientific community and dealing with the problems of social development in the Russian economy. The weights for each

group of criteria were obtained on the basis of the results of a questionnaire used as an individual communicative method.

The results of project evaluation E (SI), which serve as the basis for constructing a matrix for evaluating social and innovative projects, can be described by the following set of coordinates:

$$SI = (\sum_{i=1}^n \alpha_i \times B_i; \sum_{j=1}^m \beta_j \times A_j) = (B; A), \text{ where}$$

α_i —weight of criterion B_i , determined by means of expert evaluation;

β_j —weight of criterion A_j , determined by expert evaluation.

Each project will be described by a set of parameters $SI = (B; A)$, which determine the position of the project in the adapted McKinsey matrix, on which basis it is proposed to use a specific shared economy instrument. A list of tools LT_2 is drawn up on the basis of the position of the project in the presented matrix (Table 3).

Table 3. Adapted McKinsey matrix taking into account shared economy instruments.

		Average potential	High potential	High potential
Attractiveness of a socially-innovative project (A)	High	Match Funding Crowdacting Crowdlending	Match Funding Crowdacting Crowdworking	Match Funding Crowdworking Support funds Crowdinvesting
	Average	Low potential	Average potential	High potential
		Crowdfunding Crowdacting Crowdlending	Crowdfunding Crowdacting Crowdworking	Crowdfunding Crowdworking Crowdinvesting
		Low potential	Low potential	Average potential
	Low	Crowdlending	Crowdworking	Crowdinvesting
			Low	High
		Competitiveness of socially-innovative project (B)		
		Average		

$$LT_2 = \{J_1, J_2 \dots J_n\} = LT(B; A),$$

LT_2 —list of shared economy instruments determined on the basis of the adapted McKinsey matrix

$J_1 \dots J_n$ —shared economy instruments recommended for the analysed project.

Using the proposed shared economy tools, the ratio of the level of attractiveness and competitiveness of projects is determined by the need for resources for each combination of these characteristics, as well as its potential when attracting stakeholders. In particular, projects with low competitiveness and low attractiveness are likely to face the problem of attracting resources whether financial or labour. However, crowdfunding can turn out to be a more advantageous tool than, for example, traditional financial instruments—in particular, bank loans. A project having a high level of attractiveness is able to draw upon tools that provide access to labour resources (crowdacting, crowdsourcing), as well as to joint funding (match-funding). A project having a high level of competitiveness is instrumental in stimulating the involvement of investors. Developers can have recourse to joint consumption of material resources with all variants of combined competitiveness and attractiveness. Table 3 shows the recommended set of tools for each cell in the matrix.

It is important to note that the matrix graphs represent two or more instruments of the equity economy, thus explaining the interchangeability of labour and capital in the Cobb-Douglas production function. At the same time, a tool that attracts finance is more in demand, due to the higher transformation rate of financial resources in comparison with labour.

3.2.3. Step 3. Formation of an Algorithm for Allocating Social Project Resourcing Tools Taking Prioritisation into Account

At the third stage, a list of proposed tools is determined, taking into account the potential of the project and the functions being implemented by it.

The list of recommended instruments T is formed by combining the first $LT1$ and second recommendations $LT2$. In the final list, the received instruments are arranged in order of priority, which is determined by the frequency of recommendations for the use of one or another instrument in the list being formed.

$$T = LT1 \cup LT2 = \{v(t_1); v(t_2); \dots v(t_n)\}, \text{ where}$$

(t_i) is the frequency of referring to the instrument t_i , and the values $v(t_1), \dots, v(t_n)$ are arranged in descending order.

3.2.4. Step 4. Adjustment of the List of Proposed Instruments Taking the Specifics of the Institutional Environment into Account

The influence of the institutional environment on the development of social innovation can vary. While, on the one hand, an ineffective institutional environment creates barriers to the development of social innovation, on the other hand, the global nature of socio-economic processes, the blurring of geographical boundaries in the conditions of the formation and development of the digital economy allows resources to be attracted from other territories and countries, while eliminating local and regional institutional barriers.

If the possibility of introducing and applying certain instruments depends on the institutional conditions for the development of the territory, when forming the final list of instruments, it is necessary to pass them through the filter of the institutional environment and eliminate those instruments for which the necessary conditions have not been created. At this stage, we propose to use the previously developed methodology for analysing the institutional environment based on the assessment of characteristics such as inclusiveness, hybridity and flexibility.

While flexibility is understood in terms of the capability of economic institutions (whether formal or informal) to adapt to changes in environmental conditions, hybridity consists in the ability to combine the solution of a social problem and a commercial component. Inclusiveness, on the other hand, is the rational use of the characteristics (skills, abilities, and knowledge) of each member of society to involve them in solving social problems, thereby increasing the civic engagement of the population [60].

This analysis is based on the regulatory characteristics of a particular region or municipality. If the evaluated projects belong to the same region and the level of development of the institutional environment is reasonably high, this analysis will not give significant results and can be omitted.

The institutional environment can be described by a set of criteria similar to those used for the description of projects:

$$I = \begin{pmatrix} H1 & I1 & F1 \\ H2 & I2 & F2 \\ H3 & I3 & F3 \end{pmatrix} \quad (5)$$

where

$H1, \dots, H3$ are hybridity characteristics;

$I1, \dots, I3$ are characteristics of inclusiveness;

$F1, \dots, F3$ are characteristics of flexibility.

An elucidation of the criteria is presented in Table 4.

The total score for each characteristic of the socially-innovatory institutional environment can be calculated using the formula:

$$H(SI) = \sum_{i=1}^n \mu_i \times H_i \quad (6)$$

assessment of the hybridity of the institutional environment; μ_i —weight coefficient, i is the criterion number, n —the number of criteria.

Table 4. Criteria for assessing the institutional environment.

No.	Indicators	Description	Points	Weight Coefficient, μ_i
Hybridity				
1	Area of regulation (H1)	Interaction between government and innovator	3—full regulation 2—partial regulation 1—no regulation	0.4
2	Combining social and commercial goals (H2)	Combining social and commercial goals (analysis of income, expenses and problem solving)	3—solving the problem and receiving a grant 2—partial solution of the problem and receipt of a grant 1—partial solution to the problem and no grant	0.3
3	Aggregate of legal entities (H3)	Interaction between government and the business	3—more than 3 legal entities 2—the presence of 2 legal entities 1—the presence of 1 legal entity	0.3
Flexibility				
1	Institute period (F1)	Return of institutions regulating social innovation	3—growing 2—longstanding 1—withdraws from positions	0.3
2	Linkages with other institutions (F2)	Interaction of institutions—comparison of institutions regulating SI	3—production (basic) 2—resource (providing) 1—managerial (regulatory)	0.4
3	Frequency of changes in the legal framework (F3)	Error correction frequency	3—full application (always accepted) 2—partial application (sometimes accepted) 1—no application (not accepted)	0.3
Inclusiveness				
1	Costs of agents performing institutional functions (I1)	Period of entry into the system	3—low costs (1 month) 2—average costs (from a month to a year) 1—high costs (over a year)	0.4
2	Scope of institutional functions that regulate socially-innovative activity (SIA) (I2)	Description of the functions of institutions	3—51–100% coverage of SIA aspects 2—11–50% coverage of SIA aspects 1—less than 10% coverage of SIA aspects	0.3
3	Level of civic engagement (I3)	Volunteering level	3—60–100% volunteer participation 2—30–59% volunteer participation 1—0–29% volunteer participation	0.3

This assessment technique can be used to assess the level of development of the presented characteristics. The higher the value, the higher the development level of the institutional environment in the considered territory. In particular, with a high level of inclusiveness, crowddacting, crowdworking, and crowdfunding will be developed. With a high level of hybridity, match funding will be developed, as well as traditional forms of support for projects of various types. The presence of flexibility indicates the development of new instruments, for example, crowdlending and crowdinvesting, which are associated not only with the development of formal, but also informal institutions.

Thus, depending on the prevailing characteristic, a recommendation can also be made to clarify the set of tools for resourcing the proposed project. The need to adjust for the institutional environment can be justified using the example of crowdfunding. Let us suppose that, based on the analysis of the implementation of the first three stages of the described algorithm, it was proposed that the developer use crowdlending. However, with insufficient development of crowdlending, provided that the development of the inclusiveness of the institutional environment is high, this instrument can be replaced by crowdfunding in its classical form.

The logic of developing a resource provision strategy for a project described in the work can be presented in the form of an algorithm, as shown in Figure 2.

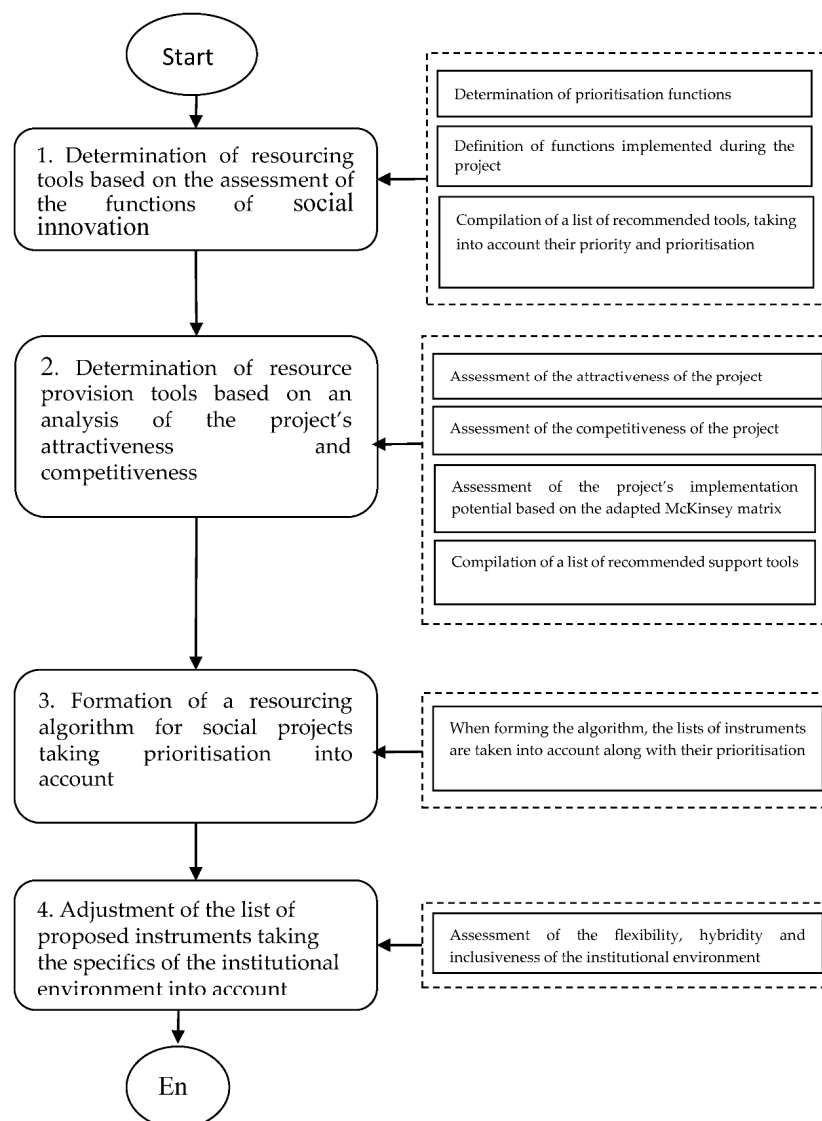


Figure 2. Algorithm for the formation of a resourcing strategy for a socially-innovative project.

An example of the use of this algorithm for assessing social projects in the Ural Region is presented in the next paragraph.

4. Results

In order to demonstrate the application of the presented algorithm and assessment system for socially-innovative projects we used case studies. An analysis of 10 social projects was carried out as presented in Table 5. When forming this list of projects, the following criteria were used: projects that were financed by a grant and projects for which the developers applied to support funds for financial support. The information base consisted of data derived from the Sverdlovsk Regional Fund for Entrepreneurship Support and the Internet portal of the Presidential Grants Fund.

Table 5. Description of social projects.

No.	Name of Project	Project Description
1	CC “Boniface”	provision of services for disabled children and families with disabled children
2	Mobile planetarium	conducting extracurricular classes in astronomy
3	Univer ONLINE	distance learning in a boarding school for deaf and dumb children
4	Children’s leisure centre “Viktorinka”	organisation of leisure activities for children
5	Atelier “Seam-master”	sewing and dressmaking training for adults and children
6	Project “To live”	Prevention, assistance and support for people affected by socially significant diseases, as well as controlling the spread of HIV infection in vulnerable groups in the city of Ekaterinburg and the region
7	“The Language of Good Deeds”/The First Official Glossary of Russian Philanthropy	Creation of a multimedia methodological guide based on the results of the study and its distribution among sector participants in the regions.
8	Bureau of Social and Legal Assistance to Migrants and their Family Members	Providing legal assistance in case of violation of rights and legitimate interests, consolidating the efforts of NGOs and public authorities in terms of protecting rights and preventing violations, conducting public monitoring of violations of labour rights of external and internal migrants in the Sverdlovsk region.
9	“The Way Home”: comprehensive support centre for foster families, assistance in family placement of orphans and children left without parental care	Creation of a system of comprehensive support for foster families, as well as professional training and selection of candidates for adoptive parents, guardians or foster carers.
10	Resocialisation: creative laboratory with the participation of prisoners	Resocialisation of imprisoned citizens through inclusion in creative projects. Creation of prerequisites for the further development of prisoners and the implementation of options for peaceful activities following their release.

The projects presented in Table 5 are all being implemented in the Sverdlovsk region and have social significance for the region. For the first five projects, the developers contacted the Entrepreneurship Support Fund in 2019–2020. The remaining five projects were funded by the Presidential Grants Fund.

The sequential application of the stages of the presented algorithm made it possible to determine a set of tools for the resourcing of the presented projects (Table 6).

Table 6. Analysis of social projects.

No.	Name of Project	Social Project Function Coding	McKinsey		Recommended Shared Economy Instruments
			B	A	
1	CC “Boniface”	1 2 1 1 2 1 1	0.9	1.4	Crowdfunding, Crowdfunding
2	Mobile planetarium	3 3 2 1 2 1 1	1.70	1.4	Match Funding, Crowdfunding, Crowdfunding
3	Univer ONLINE	2 3 2 1 2 1 2	1.70	1.7	Crowdfunding, Match Funding, Crowdfunding
4	Children’s leisure centre “Viktorinka”	2 2 1 1 2 1 1	0.9	1.4	Crowdfunding, Crowdfunding
5	Atelier “Seam-master”	1 1 1 1 2 1 1	1.3	1.4	Crowdfunding, Crowdfunding
6	Project “To live”	3 3 1 3 2 2 2	1.3	1.6	Crowdfunding
7	“The Language of Good Deeds”/The First Official Glossary of Russian Philanthropy	2 2 1 1 2 1 1	1.7	1.9	Crowdfunding, Crowdfunding
8	Bureau of Social and Legal Assistance to Migrants and their Family Members	3 3 2 1 2 1 1	1.7	1.3	Match Funding, Crowdfunding, Crowdfunding
9	“The Way Home”: comprehensive support centre for foster families, assistance in family placement of orphans and children left without parental care	2 2 1 1 2 1 1	1.3	1	Crowdfunding, Crowdfunding
10	Resocialisation: creative laboratory with the participation of prisoners	1 3 2 1 2 1 1	2.1	1	Match Funding

In order to concretise the application of this algorithm, we will consider the procedure for forming the final list of instruments on the detailed example of the project of CC “Boniface”. During the implementation of the first stage of the algorithm, the following list of equity economy instruments was recommended: crowdfunding, match funding, crowdsourcing, crowdworking, appeal to support funds, crowdfunding and crowdtesting. At the second stage, during the application of the project assessment, this list was supplemented with such tools as crowdfunding, crowdfunding and crowdtesting, taking the adapted McKinsey matrix into account. Comparing these lists, we can conclude that it is preferable to use crowdfunding and crowdfunding, but this result does not preclude the developer from using other recommended tools. The insufficient flexibility of the institutional environment in the Sverdlovsk region, revealed in previous studies [60], is the reason for the underdevelopment of special platforms operating on the principles of crowdfunding, which will also make adjustments to the recommended list of tools at the implementation stage.

In the list presented in Table 6, the equity economy instrument is highlighted in bold if the priority of its use is higher according to the frequency of its occurrence during the implementation of the described algorithm. The table contains only those instruments whose frequency exceeds 1.

According to the results of the assessment of social projects, each project is offered a set of tools for the development of its social business. The presented algorithm, together with the proposed system for assessing social and innovative projects and the corresponding institutional environment, can be used as a basis for the development of an online calculator that allows a project developer to develop a resource strategy, both independently and taking into account the proposed support. This online calculator can be used by support foundations of various levels, centres for social innovation and social entrepreneurship in support of social projects and consulting social entrepreneurs.

5. Discussion

During the discussion of the obtained results, two key aspects should be distinguished that require justification: (1) meaningful, describing the advantages and disadvantages of the proposed approach; (2) instrumental, showing the strengths and weaknesses of the applied mathematical apparatus in

comparison with other tools that facilitate decision-making. In addition, it is important to separately consider the methodological tools for assessment and management (in particular, decision-making) when justifying the feasibility and scope of the proposed approach.

The proposed toolkit has a number of advantages in terms of its content. First of all, this approach takes into account the role of social innovation in the implementation of the social functions of a particular territory, which allows a determination of the role of a socially-innovative project in the socio-economic system as a whole. Secondly, when considering the attractiveness and competitiveness of projects [61], which, in relation to social activities, can be correlated respectively with the economic and social benefits of the project, it provides for the necessary complexity of the proposed assessment. The list of proposed tools for attracting resources can be clarified by adjusting the recommendations taking into account the specifics of the institutional environment [62]. On the other hand, the development potential of the institutional environment can be identified in terms of supporting the development of the shared and platform economy [63]. The novelty of this study consists in comparing the characteristics of a socially-innovative project with the tools of a shared economy on the basis of a consideration of both internal and external characteristics, concretising the directions of social development by activating civil initiatives.

A drawback of the methodological approach is that, when developing and coding criteria, the authors rely on the results of previous empirical studies. However, when considering another region or country, these can be adjusted as required. In addition, the results of an expert assessment can be useful when expanding the range of proposed experts or choosing a different method for determining the significance of the criterion.

With regard to the application of the linear algorithm and the structural block diagram used to describe the logic of the proposed approach, it is important to note its simplicity and clarity for the reader. In addition, a separate method is used at each of the stages, which can be adjusted to take into account the characteristics of the region under consideration. This obviates the need to elaborate other tools.

The advantage of this approach also consists in establishing the relationship between assessment tools and management tools and the development of social and innovative projects. The peculiarities of this type of activity indicate the presence of a “one-to-many” relationship, where “one” characterises a cell in the adapted McKinsey matrix, and “many” refers to a set of shared-economy tools.

The methods used in this study belong to the group of multi-criteria decision-making methods. At the same time, when choosing a specific instrument of the equity economy, as well as setting priorities for their use, this approach can be supplemented by the use of the analytic hierarchy process [64].

6. Conclusions

In this study, carried out in order to develop and substantiate tools for the mathematical support of social innovation financing, the following results were obtained.

Firstly, the role of a collaborative economy in the development of social innovations initiated from below is substantiated. This takes the form of a set of described tools for a shared economy that can be used in the development and implementation of social innovations.

Secondly, the mathematically described algorithm proposed by the authors is aimed at developing resource provision strategies for social projects by evaluating their competitiveness and attractiveness in terms of the social function they perform while also taking the characteristics of the particular institutional environment into consideration. The result of applying this algorithm will take the form of a set of collaborative economy tools for use in the development and implementation of social and innovative projects.

Thirdly, the application of this algorithm is shown on the example of an evaluation of ten socially-innovative projects implemented in the Ural region and applying for help from various support funds.

The novelty of the proposed approach lies, first of all, in the compilation and adaptation of existing methods of assessment and decision-making in relation to socially-innovative activities. The main contribution to the development of the mathematical model consists in descriptive application both in terms of management tools (McKinsey matrix) and the development of a method that makes it possible to measure socially innovative projects in the context of the corresponding institutional environment. The applied mathematical tools can be expanded. This is particularly relevant when justifying the choice of equity economy instruments corresponding to projects detailed in one or another cell of the adapted McKinsey matrix.

The limitations of the described approach lie in the possible adjustment of the coding system when considering territories under significantly differing institutional conditions. In addition, as noted above, we relied on the idea of a higher liquidity of financial resources when forming the list of equity economy instruments. However, the informal institutional environment and corresponding mental characteristics of residents occupying particular territories can also be referred to when amending the set of proposed tools.

The other limitation of this study is also that the authors do not take into account the problem of endogeneity, although its importance is not underestimated. In other words, when determining the list of tools, we do not draw our attention to the development process as well as do not evaluate the project team, the incentives of its participants [65]. We are looking for tools to provide resource support for social innovation, and it is the other stage in the development of a new social product or service.

Future theoretical studies on this topic will be aimed at clarifying the proposed approach in terms of increasing its universality. This will be possible when building a model showing the relationship between factors characterising socio-economic and institutional conditions, as well as territorial development features (including historical factors), with codes in the methodology for assessing socially-innovative projects and the institutional environment. Thus, the use of the mathematical apparatus, when combined with appropriate computing power, will make it possible to adapt this approach to other institutional conditions. This will in turn become the basis for the development of an online calculator of social and innovative projects, which can be used in the development of crowd-tools and the coordination of platforms aimed at attracting resources to social projects.

Author Contributions: Conceptualization, E.P. and A.V.; methodology, E.P. and A.V.; formal analysis, E.P. and A.V.; investigation, A.V. and A.S.; writing—original draft preparation, E.P. and A.V.; supervision, E.P. All authors have read and agreed to the published version of the manuscript.

Funding: The article was prepared with the support of the Russian Foundation for Basic Research in the framework of scientific project No. 20-010-00333.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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